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The purpose of this research project was to develop a searchable database compiled with internal and external audit findings/observations. The data will correspond to the findings and observations from the date of Center-wide implementation of the ISO 9001-2000 standard to the present (2003-2008). It was derived and extracted from several sources and was in multiple formats. Once extracted, categorization of the findings/observations would be possible. The final data was mapped to the ISO 9001-2000 standard with the understanding that it will be displayed graphically. The data will be used to verify trends, associate risks, and establish timelines to identify strengths and weaknesses to determine areas of improvement in the Kennedy Space Center Business Management System Internal Audit Program.

The project started with learning how the Business System functioned and how this office maintained and enforced the system to ensure both compliancy and efficiency. The Business Systems Process followed guidelines based loosely on the ISO 9000 standard, a system of international standards to ensure quality management. ISO 9000 requirements include a set of procedures to cover all key processes in the business, monitor processes to ensure they are effective, keep adequate records, check output for defects, with appropriate and corrective action where necessary, regularly review individual processes and the quality system itself for effectiveness, and facilitate continual improvement. The Business System at Kennedy Space Center is responsible for maintaining Kennedy documents and requirements, the OFI system, performance metrics, and internal audits to ensure compliancy to the Business Systems process. The support analysis provided was to develop a way to analyze the quality system itself for effectiveness by creating a database incorporating audit report findings and OFIs, and using trend analysis and risk assessment on the data gathered.

Our first task in completing this project was to plan and outline a structure for the database. The database was created using Microsoft Office Access, an application utilizing relational tables. The first task involved planning the database in order to determine a list of tables that might be used and fields to populate these tables. Four tables were eventually created: Audit Report, Audit Report Findings, Contact Information, and OFIs. These tables were linked by several common fields, creating a relational database which allows a user to pull information on several records at one time. The Audit Report table contained the fields: Audit Number, Auditor Last Name, Directorate, Directorate POC, Date of Audit, Duration, Fiscal Year, Potential Non-Conformances, Non-Conformances, Total # of Findings, Data Report Issued, #

Days to Release Report, and Executive Summary. These tables contained summary information on the Audit Reports, with more in-depth information such as the specific finding and observation in the table Audit Report Findings. Headings for this table included Audit Number, Potential Non-Conformance, Non-Conformance, OFI Number, ISO Clause, ISO Standard, Document(s) #, and Finding Statement. The Audit Number field is repeated in both tables in order to create a relational field so the data can be linked together. The contact information field was created in order to display the Name, Phone #, and E-mail of the lead auditor for that Audit Report. The contact information table was related to the Audit Report Table via the name column for the lead auditor.

The OFI Table was not created for this project, but is part of the OFI Database that contains information for all OFIs issued for Kennedy Space Center. OFIs stand for Opportunity for Improvement, a service available for civil servants and contractors to suggest ways to improve NASA operations. Audit Reports that usually result in non-conformances are accompanied by OFIs. Once an OFI is issued, the Directorate must take certain actions to resolve and close the OFI; including finding a root cause and issuing a corrective action plan (CAP). This table was linked from the OFI Database in order to provide the user of the Audit Report Database with information about the OFI issued in response to Audit Report Non-conformances. The OFI table can also be used to analyze metrics, including the amount of time taken for each step and the total number of days taken to process each one. With the OFI metrics, we can determine whether the OFIs issued in accordance with Audit Reports are taking shorter or longer to process than normal OFIs, again, helping to determine the effectiveness of the Business System Process.

Once the database was planned out and the tables and fields created, the crux of the project began, entering the Audit Report Data into the database. Information from Audit Reports from 2003 to 2008 were added and categorized, based on the fields created. Audit Reports usually involved three different files, the plan, checklist, and final report. The plan outlined summary information for the upcoming audit and provided a general overview of what would be audited. The checklist is filled out by the lead auditor and documents the non-conformances and potential non-conformances for each ISO Standard. When the field audit is finished, the lead auditor submits the checklist to the Business Systems Branch to compile the final report that will be sent to the Directorate. The Directorate must then take any necessary action that is a result of the Audit Report.

The database created incorporated parts of all three documents. These documents were usually written as Word files, so extracting and compiling the information became an arduous process. The Business Systems Branch works to conduct an audit of each Directorate every 18 months, which results in a total of 12 audits per year. The total time period involved in the project was 6 years, from 2003-2008. The internal audit findings were combined with external

audit findings from the NQA, an organization that verifies ISO compliance and issues recertification.

Once the audit report information was compiled into the database, I began creating macros and forms to make the database more user-friendly. The goal of this database is to not only analyze past data, but also make it convenient and accessible for future users. I want to eliminate unnecessary data entry, including making both a Word file of the audit report and then entering the information into a database. With this goal in mind, the job is not only entering the findings/observations into a database so it can be analyzed, but also making it user friendly. The database should reflect past data, but also anticipate future problems that might arise when inputting the data.

A macro is a set of computer instructions that can be recorded and associated with a shortcut key combination or a macro name. Then, when the shortcut key combination is pressed, the computer program carries out the instructions of the macro. Macros help add functionality and programmability to the database, making it easier to use for someone who is not intimately familiar with Microsoft Access. Forms, like macros, add functionality to the database, by simplifying the process of inputting data. For this database, I created five forms, one for each table, and a fifth for the switchboard. The forms contain the same information and headings as the tables, but are organized in a more user-friendly manner. They also contain macros to automate the adding of information, and ensure that few to no mistakes are made by the user. A switchboard is a type of form that contains buttons or links that enables the user to navigate around the database. The switchboard appears when the user first opens the database, and makes navigating around the tables and forms easier for someone not familiar with Access.

After creating the forms and macros, analysis on the findings could begin. The analysis was intended to incorporate both trend reports and risk assessment. However, after creating the database, we soon realized risk assessment would probably not be possible due to the difficulties in assigning risk values to different findings and standardizing them. In order to create trend reports, I was first required to create queries. Queries are applications in Microsoft Access that allow the user to filter and find specific information. Once this information is found, it can be compiled into graphs or charts. These graphs can then be filtered and changed based on table headings, allowing the user to create detailed trends by only viewing certain information. The queries created for this database include: Findings over Time, Findings per Fiscal Year, Findings per ISO Standard, ISO Standard Violations, Number of OFIs Issued, OFI Metrics, PDCA Trends, Root Cause Reject Rate, and Status of OFIs. These trends incorporate both Audit Report metrics and OFI metrics in order to provide comprehensive findings.

One of the last aspects of the database created was the report application. The report application in Microsoft Access eliminates the need to create manual Word files by incorporating

the information compiled in the database into a way specified by the user. Once this report is created for one audit finding, it can be saved and created automatically for each subsequent finding.

This project resulted in a database that will help the Business Systems analyze their processes to ensure the quality and efficiency of their system. Contributing members to this project included my mentor and Business System Analyst, Mrs. Delia Markham, my co-intern, Justin Birbal, the Audit Program Manager, Ken Young, the Business System Manager, Michael Bell, and the Continual Improvement Specialist and OFI Analyst, Donna Lozaw.